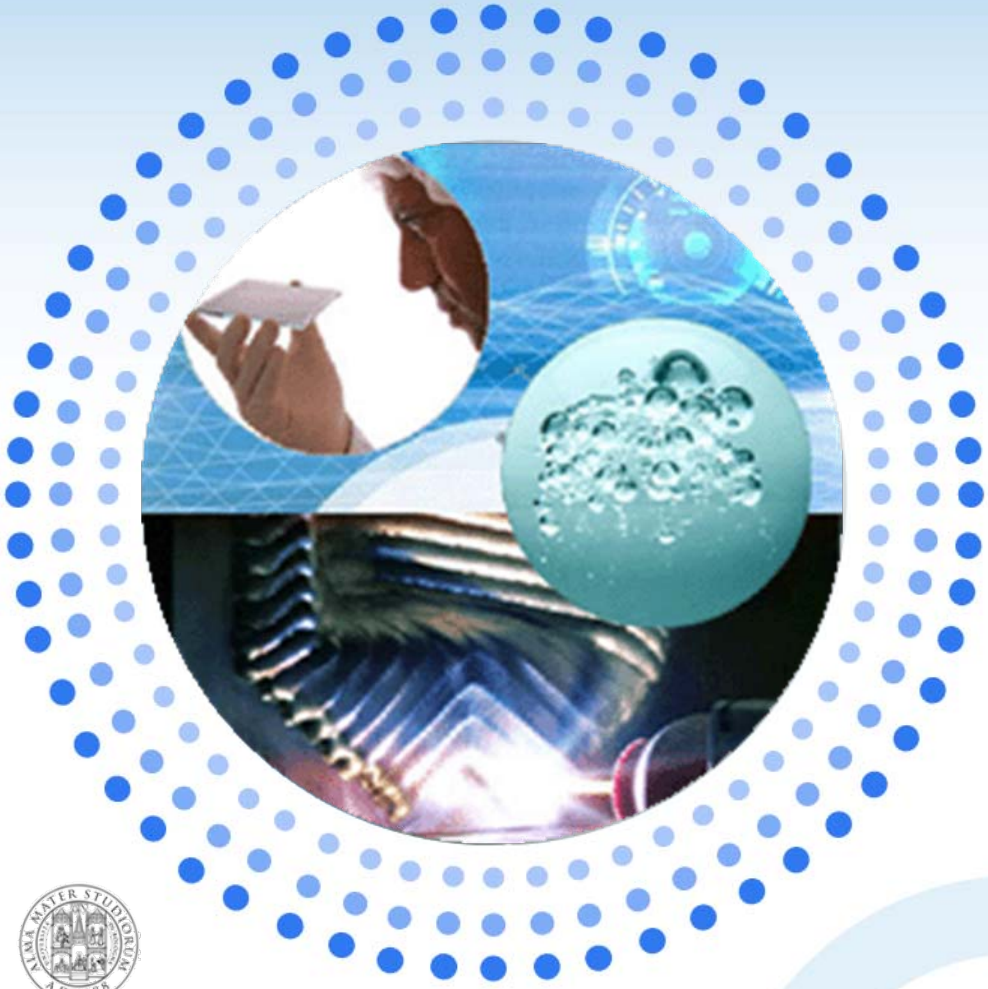

How a common solution for emerging risk management will look like and be applied ?

-

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  - A tentative of new paradigm for ER
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Evolving context of industrial risk management and needs

- On the basis of latest industrial accidents [Dufour 2008, Perrow 1999]:
  - Increase of complexity in systems
  - Emergence of non technical causes of accidents
    - Natural hazards affecting the technical system
    - Social and Regulatory environnement
    - Human, Organisational and Cultural
    - Economical and Financial environnement
    - …

⇨ A need for an integrated risk management

⇨ Covering all these dimensions

Reminder of existing frameworks for an integrated risk management

Reminder on Features of Emerging Risks

- Definition as described in the DoW
  - (a) risk previously not recognized and caused by :
    - new processes, new technologies,
    - (a') (slightly different because better known, 'less emergent') new ways of working or social or organisational change (e.g. risks linked with nanotechnology, biotechnology, ICT technologies, new chemicals, effects of globalization etc); or,
  - (b) a long-standing issue is newly considered as a risk due to a change in social or public perceptions (e.g. stress),
  - (c) new scientific knowledge allows a long-standing issue to be identified as a new risk, e.g. in the situations where cases have existed for many years without being identified as risk because of, e.g., lack of scientific.

New & emerging risks: The risk is considered new & emerging if:

(a) the risk was previously not recognized and is caused by new processes, new technologies, new ways of working, or social or organizational change (e.g. risks linked with nanotechnology, biotechnology, ICT technologies, new chemicals, effects of globalization etc); or,

(b) a long-standing issue is newly considered as a risk due to a change in social or public perceptions (e.g. stress, bullying); or,

(c) new scientific knowledge allows a long-standing issue to be identified as a new risk, e.g. in the situations where cases have existed for many years without being identified as risk because of, e.g., lack of scientific knowledge.

- Emerging :
  - Totally new
  - Increasing likelihood
  - Increasing exposure
  - Increasing consequences
- Rising ⇨ Few data collected
- More qualitative, subjective than quantitative and objective

⇨ interest for the IRGC framework

Existing frameworks for integrated risk management (1/2)

- Starting from the iNTeg-Risk description… (T-H-C-R)
  - ERMF : Emerging Risk Management Framework
    - 4 dimensions of risk management : T, H, C, R
    - Relying on the Framework developed in Shape-Risk

- **[T]** Technical, technological: Technical knowledge and technologies supporting the knowledge.
- **[H]** Human, management: Skills of personnel and organization of the human resources
- **[C]** Governance, communication: A process with clear definition of role and responsibilities of the management of a decision making process involving several stakeholders, and the associated communication organization
- **[R]** Policies regulation, standarization: Clear and complet regulatory framework, standards and norms

Existing frameworks for integrated risk management (2/2)

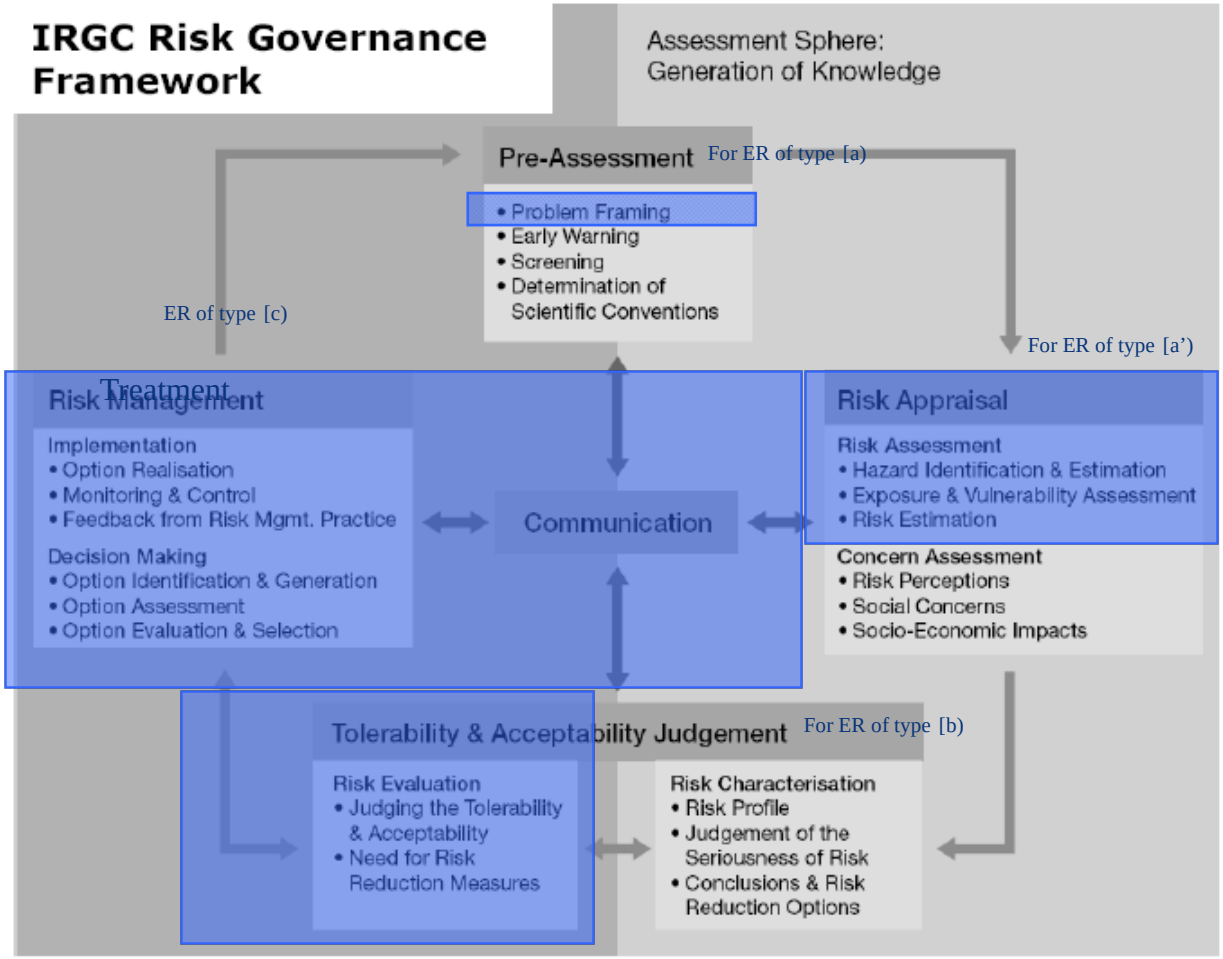
- The IRGC framework
  - Already presented (ref.7.2)
  - Communication centered
  - For ER, necessary phases of:
    - Pre-Assessment
    - and Appraisal (social perception)
    - ER acceptance
  - And the industrial risk Management process phases:
    - Problem Framing
    - Risk assessment
    - Risk evaluation
    - Risk treatment

Framework for an integrated risk management focused on Emerging Risks

Two perspectives of risk

- Societal perspective
  - Risk is uncertainty about, and severity of the consequences (or outcomes) of an activity with respect to something that humans value (Renn, Arven, 2008)
    - Point of view of IRGC framework
    - Focused on values, « outsider perspective »
    - Rationality from values and consensus
- Organisational perspective
  - Risk is the consequence of an event on the capability of an organisation to achieve its objectives (proposition for ISO31000)
    - Point of view of ISO31000
    - Organisation: company, association, public service….
    - Focused on objectives, « insider perspective »
    - Rationality from efficiency
- *The stake: integration of these perspectives*

Tentative of comparison of IRGC Framework and ISO 31000



Implementation of risk management process on the case of outsourcing a task critical to safety – ERRA C1

- ERRA C1 dealing with outsourcing a task critical to safety
  - the risk has raised ⇨ of type (a')
  - following **Risk Management Process** based on [CEI73], [ISO 31000], [Gouriveau 2003], [Duval 2007], [Léger 2008]:

"Start of Risk Appraisal:

- definition of the studied system: limits, objectives, stakes (safety, availability, life cycle management) and stakeholders
- hazard identification (and opportunities?)
- choice of a model of the studied system: model of the organisation, model of the accident
- causes/consequences analysis
- *assessment of the model ?* **End of Risk Appraisal"**

"Start of Risk Tolerability and acceptability judgement:

- *Definition of criteria for priorization*
- *Priorization of risks ?* **End of Tolerability and acceptability judgement"**

Implementation of risk management process on the case of outsourcing a task critical to safety – ERRA C1

- ERRA C1 dealing with outsourcing a task critical to safety
  - the risk has raised ⇨ of type (a')
  - following **Risk Management Process** based on [CEI73], [ISO 31000], [Gouriveau 2003], [Duval 2007], [Léger 2008]:

Risk Appraisal

Risk Tolerability and acceptability judgement

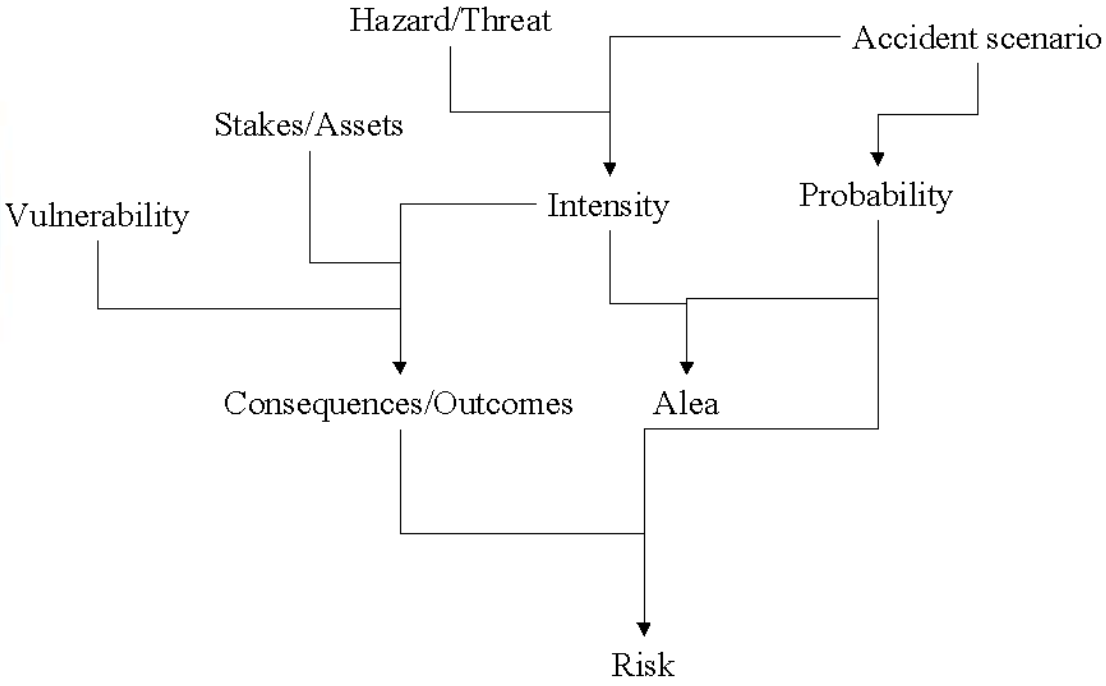
"Start of Risk Treatment:

- Identification of Risk reduction/mitigation (consequences)
- identification of *acceptance* criteria
- decision making on these options/ *acceptance* criteria
- assessment of the remaining risks after treatment
- implementation of the options and follow up
- *capitalisation of the experience*
- *warning system: weak signals, whistle blowers… to detect ER of type (c)*

End of Risk Treatment"

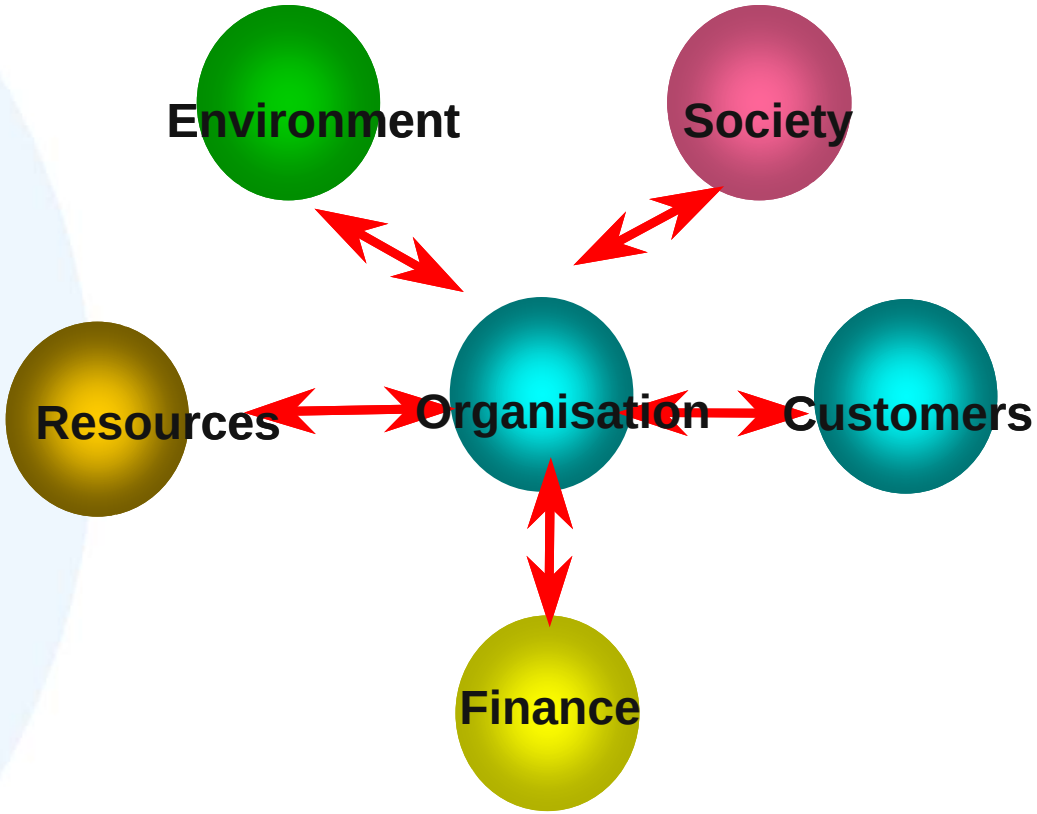
The relevant dimensions of risk

- **In addition to this tentative to compare IRGC and ISO 31000 Frameworks**
- **A proposal for relevant dimensions of risks for the new paradigm**
- NEEDS New Energy Externalities Developments for Sustainability Internal Paper - RS 2b, WP7 “Risk Indicators proposal based on an analytical framework” [Deleuze 2007]



The relevant dimensions of risk

- The GLORIA paradigm [Deleuze 2003]: a systemic representation of risks



The relevant dimensions of risk

- Risks could be added to the ERMF Framework for iNTeg-Risk
  - Environmental in its physical meaning, natural hazards (as it is considered in ERRA D3)
    - ⇨ **E?**
  - Resources including raw material, data, energy, infrastructures, supply chain management and business continuity
    - ⇨**Res?**
  - Finances for exchange rate, credit rate, financial market, reluctance of insurances to deal with some kinds of risks
    - ⇨ **F?**
  - Costumer/market to be coherent with ISO 9000
    - ⇨ **CM?**
- To be discussed in iNTEg-Risk, T2.1.1 and T2.1.2 (definition and description of a new paradigm)

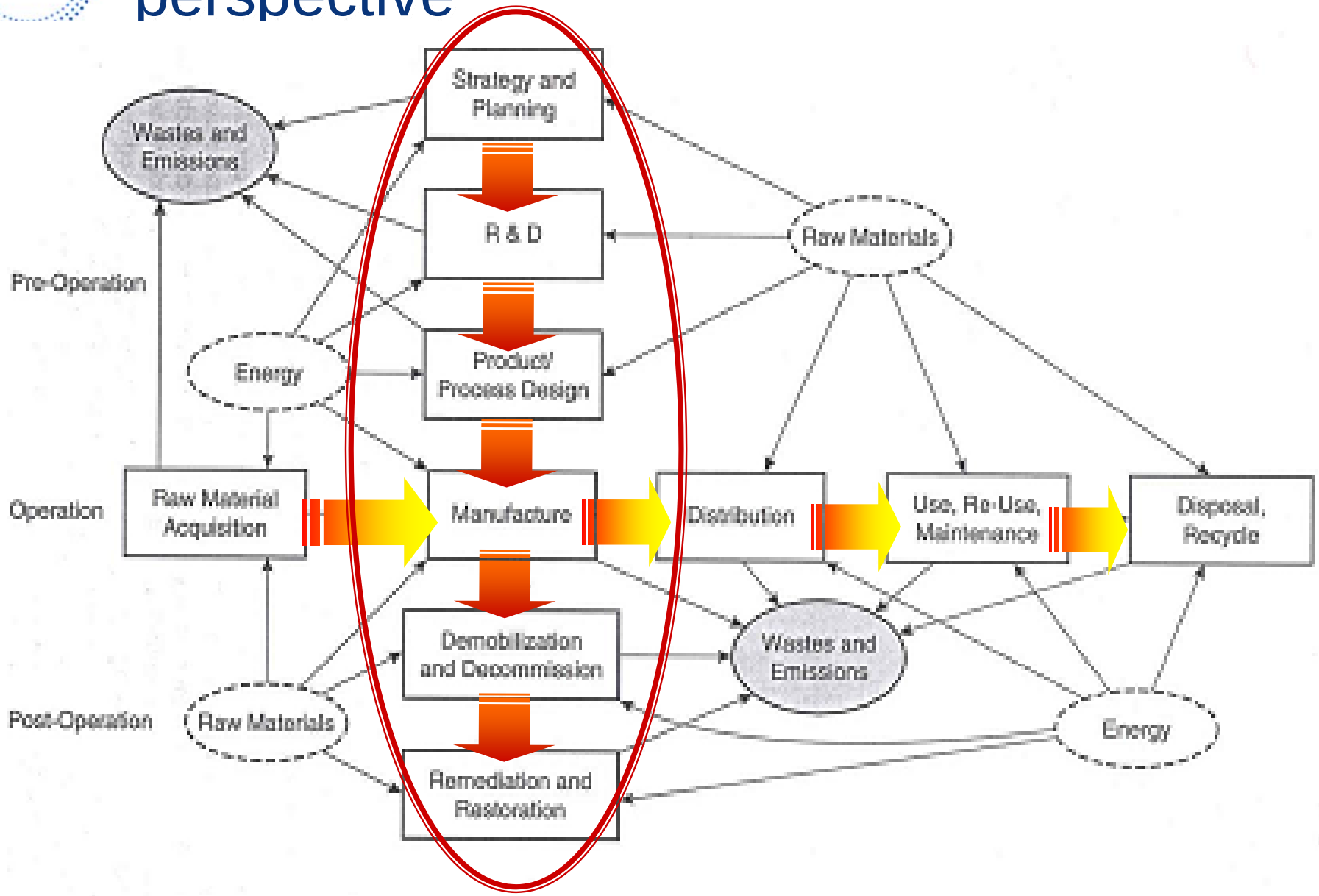
How to take into account the sustainability of risk, that should be assessed considering all the impacts related to the different receptors in a process and product life-cycle perspective?

(V. Cozzani)

Process Safety Assessment

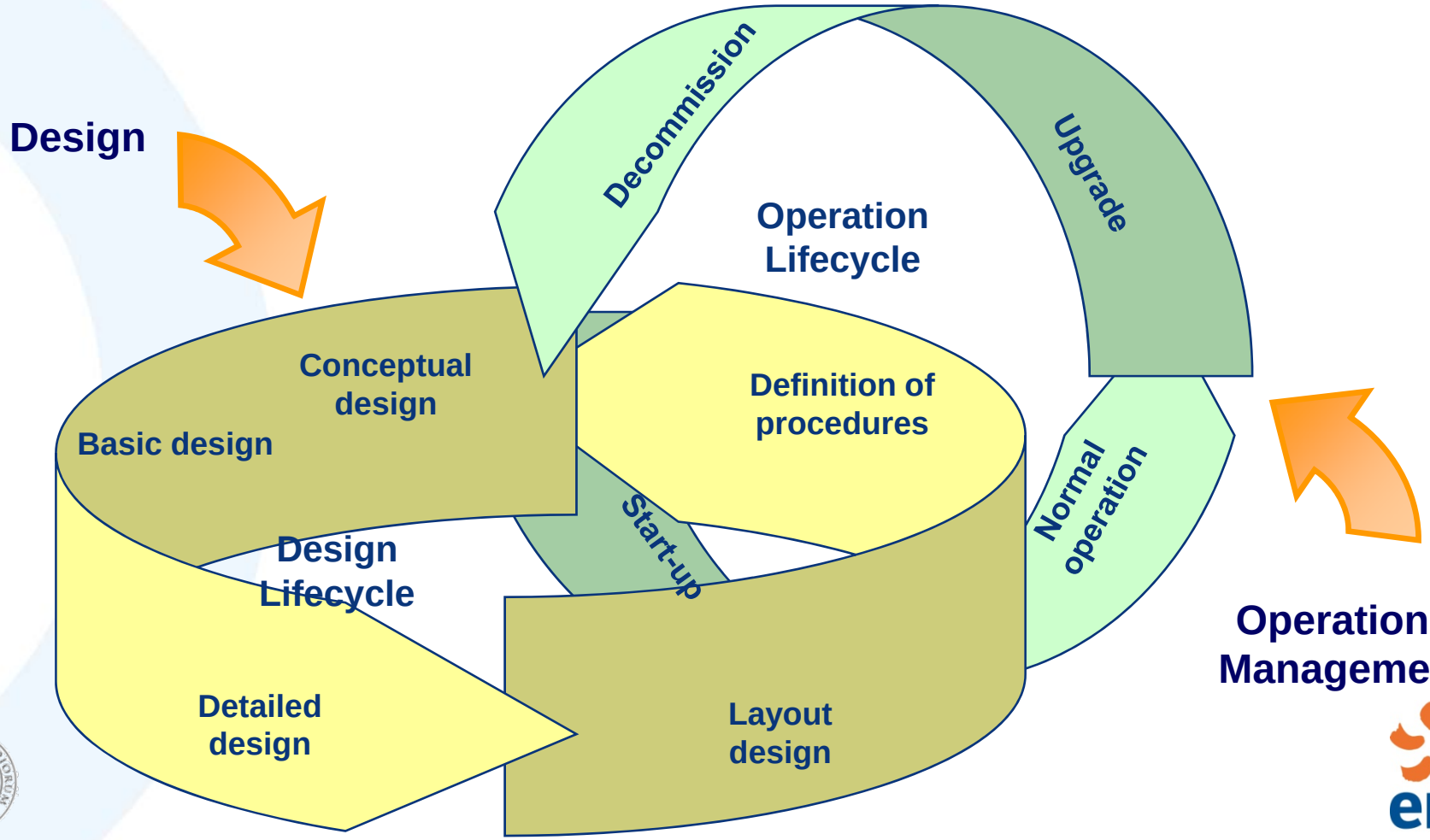
- Process design safety gates are usually only concerned with normal operation, start-up and shut-down procedures
- A process lifecycle assessment is usually not applied in detail during process design
- Safety streamline during process design usually does not explore the impact of design decision making on product or life-cycle safetyconsidered

Process and product life cycle perspective



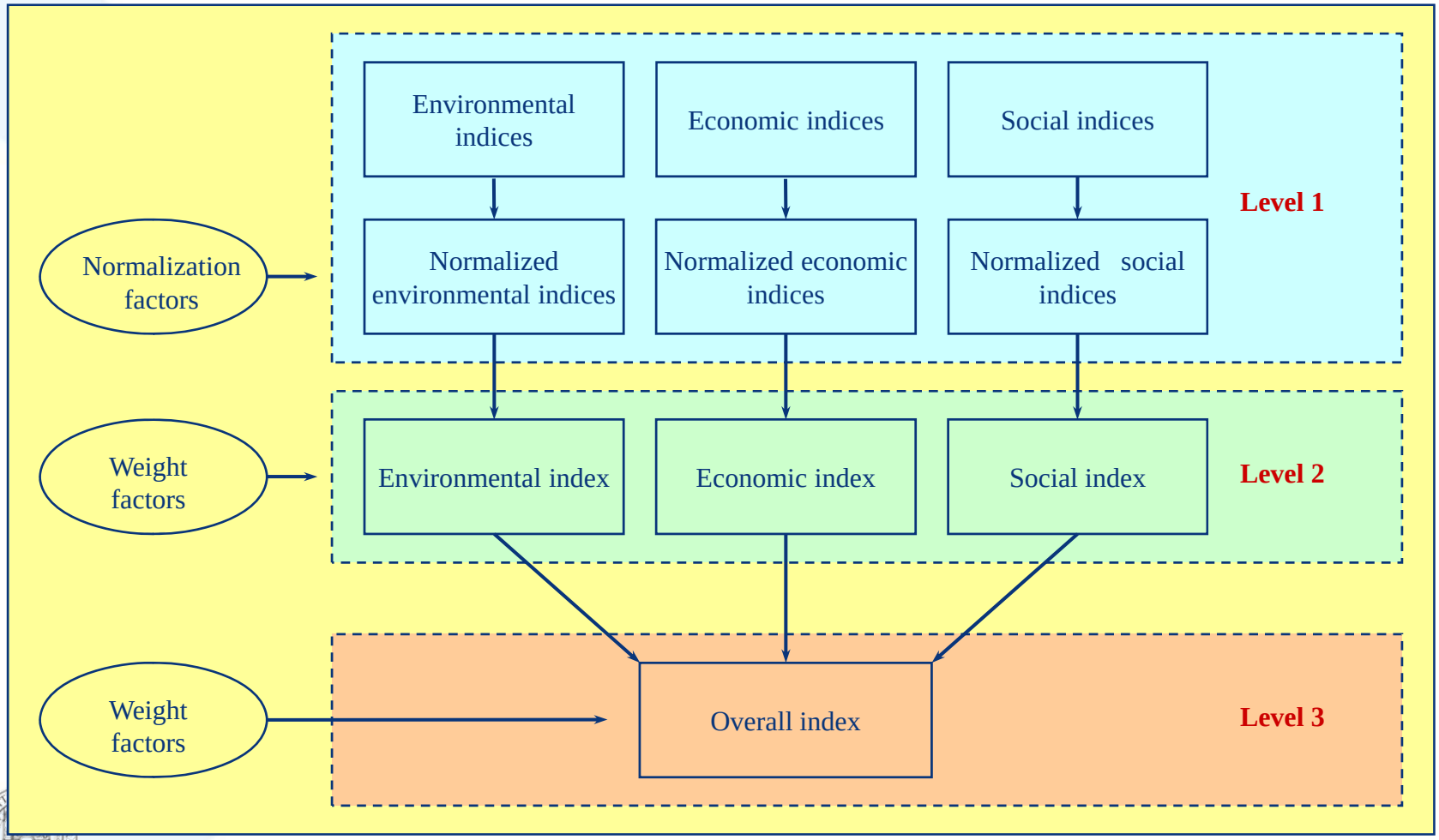
Process and product life cycle perspective

Safety assessment needs to be extended to all stages of the lifecycle

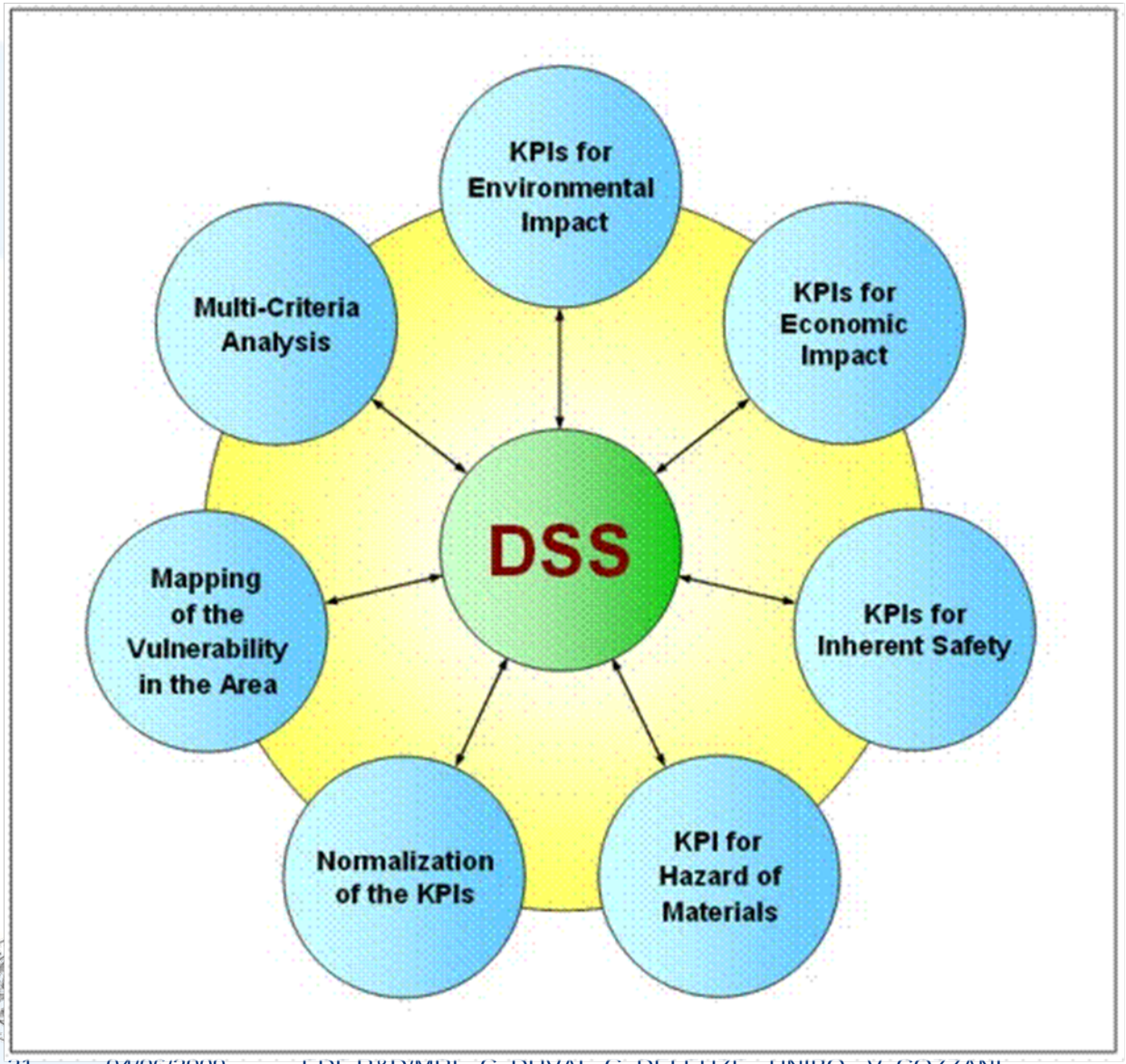


Integrated risk management: safety is only one issue!

An integrated framework needs to be created for the assessment of design sustainability



Integrated risk management: safety is only one issue!



Decision support during design needs to gather information coming from an holistic assessment of process impact

<u>Key Performance Indicators (KPIs)</u> may be a useful support tool to build the framework for informed decision making

A life-cycle perspective…

- Safety assessment during process design needs to be changed
- Besides process-specific safety assessment, integrated impact of process life-cycle stages need to be considered
- Process and product life-cycle need to be integrated
- Dynamic sets of KPIs may create the context for an informed and flexible decision making